

1. A media alignment mechanism for aligning each sheet of media with a reference edge for providing a desired media alignment direction during its advancement along a predetermined path comprising:
  - a pair of spaced elements defining the predetermined path along which each sheet of media
  - 5 is advanced and having a substantially constant space therebetween;
  - a first reference edge segment supported for disposition between said pair of spaced elements, said first reference edge segment having a media engaging surface for initially engaging a portion of a sheet of media as it is advanced relative to said first reference edge segment;
  - 10 first advancing means for advancing a side surface of the sheet of media into said media engaging surface of said first reference edge segment and along said media engaging surface of said first reference edge segment;
  - a second reference edge segment spaced from said first reference edge segment in the direction of advancement of the sheet of media, said second reference edge segment
  - 15 supported for disposition between said pair of spaced elements, said second reference edge segment having a media engaging surface for engaging a portion of the sheet of media as it is advanced relative to said second reference edge segment;
  - second advancing means for advancing the side surface of the sheet of media into said media engaging surface of said second reference edge segment and along said media
  - 20 engaging surface of said second reference edge segment to align the sheet of media with said media engaging surface of said second reference edge segment;
  - said second reference edge segment having said media engaging surface providing the desired media alignment direction;

- each of said pair of spaced elements having a non-linear portion between said first reference  
25 edge segment and said second reference edge segment for supporting and guiding  
the sheet of media during its advancement from said first reference edge segment to  
said second reference edge segment, said non-linear portions having a shape to  
break the beam of the sheet of media during its advancement through the space  
between said non-linear portions to enable a side surface of the sheet of media to be  
30 moved by said second advancing means into alignment with said media engaging  
surface of said second reference edge segment when the sheet of media engages said  
media engaging surface of said second reference edge segment while the side  
surface of the sheet of media is simultaneously in engagement with said media  
engaging surface of said first reference edge segment;
- 35 and said media engaging surface of said first reference edge segment being angled relative  
to said media engaging surface of said second reference edge segment so that the  
sheet of media has its leading edge pass inwardly of a media entry end of said  
second reference edge segment after its advancement through the space between  
said pair of non-linear portions to insure that the leading edge of the sheet of media  
40 does not engage the media entry end of said second reference edge segment.
2. The media alignment mechanism according to claim 1 comprising each of said first  
reference edge segment and said second reference edge segment being supported by at least  
one of said pair of spaced elements.
3. The media alignment mechanism according to claim 2 in which each of said pair of  
non-linear portions has a substantially S shape profile.

4. The media alignment mechanism according to claim 3 comprising:

said first advancing means applying a force to the sheet of media at an angle other than 90°

to said media engaging surface of said first reference edge segment during its

advancement to urge the sheet of media both against said media engaging surface of

5 said first reference edge segment and along said media engaging surface of said first reference edge segment;

and said second advancing means applying a force to the sheet of media at an angle other

than 90° to said media engaging surface of said second reference edge segment

during its advancement to urge the sheet of media both against said media engaging

10 surface of said second reference edge segment and along said media engaging

surface of said second reference edge segment.

5. The media alignment mechanism according to claim 2 comprising:

said first advancing means applying a force to the sheet of media at an angle other than 90°

to said media engaging surface of said first reference edge segment during its

advancement to urge the sheet of media both against said media engaging surface of

5 said first reference edge segment and along said media engaging surface of said first reference edge segment;

and said second advancing means applying a force to the sheet of media at an angle other

than 90° to said media engaging surface of said second reference edge segment

during its advancement to urge the sheet of media both against said media engaging

10 surface of said second reference edge segment and along said media engaging

surface of said second reference edge segment.

6. The media alignment mechanism according to claim 1 in which each of said pair of non-linear portions has a substantially S shape profile.

7. The media alignment mechanism according to claim 6 comprising:

said first advancing means applying a force to the sheet of media at an angle other than 90°

to said media engaging surface of said first reference edge segment during its

advancement to urge the sheet of media both against said media engaging surface of

5 said first reference edge segment and along said media engaging surface of said first reference edge segment;

and said second advancing means applying a force to the sheet of media at an angle other

than 90° to said media engaging surface of said second reference edge segment

during its advancement to urge the sheet of media both against said media engaging

10 surface of said second reference edge segment and along said media engaging surface of said second reference edge segment.

8. The media alignment mechanism according to claim 1 comprising:

said first advancing means applying a force to the sheet of media at an angle other than 90°

to said media engaging surface of said first reference edge segment during its

advancement to urge the sheet of media both against said media engaging surface of

5 said first reference edge segment and along said media engaging surface of said first reference edge segment;

and said second advancing means applying a force to the sheet of media at an angle other

than 90° to said media engaging surface of said second reference edge segment

during its advancement to urge the sheet of media both against said media engaging

10 surface of said second reference edge segment and along said media engaging surface of said second reference edge segment.

9. In a duplexer for use with a printer, a media alignment mechanism for aligning each sheet of media with a reference edge for providing a desired media alignment direction during its advancement along a predetermined return feed path in its return to a predetermined area of the printer for printing on its second side comprising:

5 a pair of spaced elements defining the predetermined return feed path along which each sheet of media is advanced and having a substantially constant space therebetween; a first reference edge segment supported for disposition between said pair of spaced elements, said first reference edge segment having a media engaging surface for initially engaging a portion of a sheet of media as it is advanced relative to said first  
10 reference edge segment;

first advancing means for advancing a side surface of the sheet of media into said media engaging surface of said first reference edge segment and along said media engaging surface of said first reference edge segment;

a second reference edge segment spaced from said first reference edge segment in the  
15 direction of advancement of the sheet of media, said second reference edge segment supported for disposition between said pair of spaced elements, said second reference edge segment having a media engaging surface for engaging a portion of the sheet of media as it is advanced relative to said second reference edge segment; second advancing means for advancing the side surface of the sheet of media into said  
20 media engaging surface of said second reference edge segment and along said media

engaging surface of said second reference edge segment to align the sheet of media with said media engaging surface of said second reference edge segment;

said second reference edge segment having said media engaging surface providing the desired media alignment direction;

25 each of said pair of spaced elements having a non-linear portion between said first reference edge segment and said second reference edge segment for supporting and guiding the sheet of media during its advancement from said first reference edge segment to said second reference edge segment, said non-linear portions having a shape to break the beam of the sheet of media during its advancement through the space

30 between said non-linear portions to enable a side surface of the sheet of media to be moved by said second advancing means into alignment with said media engaging surface of said second reference edge segment when the sheet of media engages said media engaging surface of said second reference edge segment while the side surface of the sheet of media is simultaneously in engagement with said media

35 engaging surface of said first reference edge segment;

and said media engaging surface of said first reference edge segment being angled relative to said media engaging surface of said second reference edge segment so that the sheet of media has its leading edge pass inwardly of a media entry end of said second reference edge segment after its advancement through the space between

40 said pair of non-linear portions of the predetermined return feed path to insure that the leading edge of the sheet of media does not engage the media entry end of said second reference edge segment.

10. The media alignment mechanism in a duplexer according to claim 9 comprising each of said first reference edge segment and said second reference edge segment being supported by at least one of said pair of spaced elements.

11. The media alignment mechanism in a duplexer according to claim 10 in which each of said pair of non-linear portions has a substantially S shape profile.

12. The media alignment mechanism in a duplexer according to claim 11 comprising:  
said first advancing means applying a force to the sheet of media at an angle other than 90°  
to said media engaging surface of said first reference edge segment during its  
advancement to urge the sheet of media both against said media engaging surface of  
said first reference edge segment and along said media engaging surface of said first  
reference edge segment;

and said second advancing means applying a force to the sheet of media at an angle other  
than 90° to said media engaging surface of said second reference edge segment  
during its advancement to urge the sheet of media both against said media engaging  
surface of said second reference edge segment and along said media engaging  
surface of said second reference edge segment for return to the predetermined area  
of the printer in the desired media alignment direction for printing on its second  
side.

13. The media alignment mechanism in a duplexer according to claim 10 comprising:  
said first advancing means applying a force to the sheet of media at an angle other than 90°  
to said media engaging surface of said first reference edge segment during its  
advancement to urge the sheet of media both against said media engaging surface of

5           said first reference edge segment and along said media engaging surface of said first reference edge segment;

and said second media advancing means applying a force to the sheet of media at an angle other than 90° to said media engaging surface of said second reference edge segment during its advancement to urge the sheet of media both against said media  
10           engaging surface of said second reference edge segment and along said media engaging surface of said second reference edge segment for return to the predetermined area of the printer in the desired media alignment direction for printing on its second side.

14.    The media alignment mechanism in a duplexer according to claim 9 in which each of said pair of non-linear portions has a substantially S shape profile.

15.    The media alignment mechanism in a duplexer according to claim 14 comprising:  
said first advancing means applying a force to the sheet of media at an angle other than 90° to said media engaging surface of said first reference edge segment during its advancement to urge the sheet of media both against said media engaging surface of  
5           said first reference edge segment and along said media engaging surface of said first reference edge segment;

and said second advancing means applying a force to the sheet of media at an angle other than 90° to said media engaging surface of said second reference edge segment during its advancement to urge the sheet of media both against said media engaging  
10           surface of said second reference edge segment and along said media engaging surface of said second reference edge segment for return to the predetermined area



of the printer in the desired media alignment direction for printing on its second side.

16. The media alignment mechanism in a duplexer according to claim 9 comprising:

said first advancing means applying a force to the sheet of media at an angle other than  $90^\circ$

to said media engaging surface of said first reference edge segment during its

advancement to urge the sheet of media both against said media engaging surface of

5 said first reference edge segment and along said media engaging surface of said first reference edge segment;

and said second advancing means applying a force to the sheet of media at an angle other

than  $90^\circ$  to said media engaging surface of said second reference edge segment

during its advancement to urge the sheet of media both against said media engaging

10 surface of said second reference edge segment and along said media engaging

surface of said second reference edge segment for return to the predetermined area

of the printer in the desired media alignment direction for printing on its second

side.

17. A method of aligning each sheet of media with a reference edge during its

advancement along a predetermined path to provide a desired media alignment comprising:

advancing a sheet of media along the predetermined path to initially engage a media

engaging surface of a first reference edge segment, disposed at a predetermined

5 position along the predetermined path, for advancement of the sheet of media into

engagement with the media engaging surface of the first reference edge segment and

along the media engaging surface of the first reference edge segment;

- advancing the sheet of media along the predetermined path to engage a media engaging surface of a second reference edge segment spaced from the media engaging surface of the first reference edge segment in the direction of advancement of the sheet of media and in a direction to clear the entry end of the media engaging surface of the second reference edge segment due to the media engaging surface of the first reference edge segment being at an angle to the media engaging surface of the second reference edge segment to so direct the sheet of media;
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- 15 and breaking the beam of the sheet of media between the first reference edge segment and the second reference edge segment to enable a side surface of the sheet of media to move into engagement with the media engaging surface of the second reference edge segment while the sheet of media is simultaneously engaging the media engaging surface of the first reference edge segment as the sheet of media is
- 20 advanced to align the sheet of media with the media engaging surface of the second reference edge segment to provide the desired media alignment.
18. The method according to claim 17 comprising breaking the beam of the sheet of media by forming the portion of the predetermined path between the first reference edge segment and the second reference edge segment with a non-linear profile.
19. The method according to claim 17 comprising breaking the beam of the sheet of media by forming the portion of the predetermined path between the first reference edge segment and the second reference edge segment in a substantially S shape profile.
20. A method of aligning each sheet of media in a duplexer for use with a reference edge during its advancement along a predetermined return feed path to provide a desired

media alignment in its return to a predetermined area of the printer for printing on its second side comprising:

- 5     advancing a sheet of media along the predetermined return feed path to initially engage a media engaging surface of a first reference edge segment, disposed at a predetermined position along the predetermined return feed path, for advancement of the sheet of media into engagement with the media engaging surface of the first reference edge segment and along the media engaging surface of the first reference edge segment;
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advancing the sheet of media along the predetermined return feed path from the media engaging surface of the first reference edge segment to engage a media engaging surface of a second reference edge segment spaced from the media engaging surface of the first reference edge segment in the direction of advancement of the sheet of media and in a direction to clear the entry end of the media engaging surface of the second reference edge segment due to the media engaging surface of the first reference edge segment being at an angle to the media engaging surface of the second reference edge segment to so direct the sheet of media;

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and breaking the beam of the sheet of media between the first reference edge segment and the second reference edge segment to enable a side surface of the sheet of media to move into engagement with the media engaging surface of the second reference edge segment while the sheet of media is simultaneously engaging the media engaging surface of the first reference edge segment as the sheet of media is advanced to align the sheet of media with the media engaging surface of the second reference edge segment for return along the predetermined return feed path to the

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predetermined area of the printer in the desired media alignment direction for printing on its second side.

21. The method according to claim 20 comprising breaking the beam of the sheet of media by forming the portion of the predetermined return feed path between the first reference edge segment and the second reference edge segment with a non-linear profile.

22. The method according to claim 20 comprising breaking the beam of the sheet of media by forming the portion of the predetermined return feed path between the first reference edge segment and the second reference edge segment in a substantially S shape profile.